

 River Protection Project Waste Treatment Plant		HLW Catalytic Oxidizer/Reducer		Data Sheet No. 24590-HLW-MKD-HOP-P0019	Rev. 0																																													
		Mechanical Data Sheet		Component No. 24590-HLW-MB-HOP-SCO-00002																																														
		Sheet 1 of 4																																																
Project	RPP-WTP	System Description	Thermal Catalytic Oxidizer/Selective Catalytic Reduction																																															
Project No.	24590																																																	
System No.	HOP	Reference Doc	Specification 24590-WTP-3PS-MBTV-TP001																																															
Building	HLW		PDS 24590-HLW-MKD-HOP-00011																																															
Quality Level	2	Associated Dwgs	24590-HLW-M5-V17T-P0004																																															
Seismic Criteria	Category III		24590-HLW-M6-HOP-P0008																																															
PROCESS DATA (Buyer)																																																		
Offgas Inlet Conditions:			Primary Offgas Inlet Composition:																																															
	Normal	Maximum	Design																																															
Vol. Flow (acfm)	2250	3062	2000 scfm																																															
Temperature (°F)	330	330	(note 1)																																															
Pressure (in wg)	-32.4	-50.9	± 80																																															
Allowable Diff Pressure (in. wg)		10																																																
Process Data Notes. 1. Design Temperature for the Thermal Catalytic Oxidizer/Selective Catalytic Reduction internals and vessel shall be determined by the Seller based on the thermodynamic activities in the equipment 2. Minimum NO _x concentration ranges to 0 lb/hr.																																																		
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Performance Requirements: 1. The destruction removal efficiency (DRE) for volatile organic compounds (VOCs) and semi-volatile compounds (SVOCs) shall be greater than or equal to 95%. The Principal Organic Dangerous Constituents (PODCs) to be used in HLW performance testing are naphthalene (CAS 91-20-3) and 2-propene-1-ol (CAS 107-18-6). A DRE greater than 95% is preferred. 2. The NO _x Selective Catalytic Reduction (SCR) unit shall perform with a reduction efficiency of 95%. 3. Dioxin and furan emissions at the outlet of the Thermal Catalytic Oxidizer/Reducers shall meet the MACT criteria of 0.2 ng/m ³ TEQ (Toxic Equivalent). <p>Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.</p>																																																		
<p>Contents of this document are Dangerous Waste Permit affecting.</p> <div style="text-align: right;"> <div style="position: absolute; top: 0; right: 0; text-align: left;">9/29/04</div> </div>																																																		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">EXPIRES 12/10/04</div>																																																		
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Rev	Reason for revision	By	Check	Review	Date																																													

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RPP-WTP PDC

HLW Catalytic Oxidizer/Reducer

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MECHANICAL DATA (Buyer)

Construction Data:

Process Equipment Dimensions (L x W x H).

Sections	12' 5' x 5' 6' ft
Overall	25' 5' x 10' ft
Operating Weight	lb
Shipping Dimensions (L x W x H)	ft
Shipping Weight	lb

Ammonia Dilution Equipment (L x W x H):

Skid dimensions with dilution fans	12' x 5' x 6' ft
Skid dimensions without dilution fans	8' x 5' x 6' ft
Operating Weight	9000 lb
Shipping Dimensions (L x W x H)	12' x 5' x 6' ft
Shipping Weight	8000 lb

Thermal Analysis Data:

Room Temperature	83 °F	Concrete Slab Base Thickness	6 Ft
Earth Temperature Under Base	70 °F	Thermal Conductivity of Concrete Slab	K = 1.8 W / m / K
Maximum Heat Loss	15 Kw		

Thermal Cycling Frequency: For design purposes, use a thermal cycle frequency of once every two (2) months for the life of the plant (40 years).

Process Pipe and Housing Fabrication Data:

Pipe Class	S11V	Housing Material	316 L SS
Pipe Material	316 L SS	Rating	ASME B16.5
Flange Material	316 L SS	Inlet Piping Size	14 inches
Flange Rating	CL 150 RF B16.5	Outlet Piping Size	16 inches
Gasket Material	316 SS Spiral-Wound / B16.20		

Ammonia Piping:

Pipe Class	S30J	Rating	ASME B16.5
Pipe Material	304 L SS	Inlet Piping Size	TBD inches
Flange Material	304 L SS	Valve Material	316/316L SS
Flange Rating	CL 300 RF B16.5	Valve Trim	TRIM 12, API 600
Gasket Material	316 SS Spiral-Wound / Graphite Filled		

Nozzle Loadings (Buyer)

Inlet:

Load Case	Fa (lb)	Fb (lb)	Fc (lb)	Ma (ft-lb)	Mb (ft-lb)	Mc (ft-lb)
Weight	400	-500	400	1000	3000	-1000
Thermal (+)	200	1000	200	2000	2000	2000
Thermal (-)	-4400	-1000	-1000	-7000	-15000	-25000
Seismic (+)	3500	3500	3500	11000	18000	18000
Seismic (-)	-3500	-3500	-3500	-11000	-18000	-18000
Normal (+)	600	500	600	3000	5000	1000
Normal (-)	-4000	-1500	-600	-6000	-12000	-26000
Occasional (+)	4100	4000	4100	14000	23000	19000
Occasional (-)	-7500	-5000	-4100	-17000	-30000	-44000

Nozzle movements at °F: $\Delta a = \underline{\hspace{1cm}}$, $\Delta b = \underline{\hspace{1cm}}$, and $\Delta c = \underline{\hspace{1cm}}$ (nominal)
 $\Delta a = \underline{\hspace{1cm}}$, $\Delta b = \underline{\hspace{1cm}}$, and $\Delta c = \underline{\hspace{1cm}}$ (design)

Outlet:

Load Case	Fa (lb)	Fb (lb)	Fc (lb)	Ma (ft-lb)	Mb (ft-lb)	Mc (ft-lb)
Weight	-1700	400	400	-200	-500	500
Thermal (+)	2000	1000	2000	100	13000	1000
Thermal (-)	-1300	-2000	-2000	-20000	-2000	-16000
Seismic (+)	4200	6600	6600	9500	75000	75000
Seismic (-)	-4200	-6600	-6600	-9500	-75000	-75000
Normal (+)	300	1400	2400	800	12500	1500
Normal (-)	-3000	-1600	-1600	-20200	-2500	-15500
Occasional (+)	4500	8000	9000	10300	87500	76500
Occasional (-)	-7200	-8200	-8200	-29700	-77500	-90500

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Notes: 1. Normal = Weight + Thermal
2. Occasional = Weight + Thermal + Seismic

HLW Catalytic Oxidizer/Reducer					
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SYSTEM PERFORMANCE (Seller)					
Volatile Organic DRE	95	%	Semi-Volatile Organic DRE	95	%
NO _x Reduction	95	%	Ammonia consumption, max	10	lb/hr
NO _x emissions, max	58	ppm @ 7% O ₂	Ammonia entering injection chamber	Dilution Air.	
Ammonia slip, max	20	ppm @ 7% O ₂	Pressure	1.0	in-WG
Ammonia/NO _x molar injection ratio	0.95		Flow	9.3	lb/hr (max)
Pressure drop through Oxidizer unit	10	in wg	Temperature	100	°F
Minimum service life of catalyst:	VOC 2	yrs (EST.)	NO _x 2	yrs (EST.)	
Recommended Catalyst replacement schedule	Test at 1 year to determine activity level. Replacement schedule could be 2-4 year intervals				
COMPONENTS (Seller)					
Catalyst:	Organic		NO _x		
Manufacturer	Engelhard (VOCAT 360 PFC)		Haldor Topsoe		
Number of reactors	9		50		
Residence time, sec	0.15		1.20		
Arrangement	2 blocks x 4.5		3.5 high x 3 wide		
Catalyst vol. per reactor ft ³	7		76.62		
Type	Precious metal - platinum		Vanadium/Titanium		
Material: base/substrate	ceramic - cordierite		ceramic - honeycomb		
Number of layers per reactor	2		5		
Thickness of layer, in	4.3		10.0		
Spacing between layer, in	0.125		0.125		
Space for additional layer, in	8.5		none		
Is dummy layer provided	Yes		No		
Flow passage, in. x in	0.066" x 0.066"		0.125" x 0.125"		
Face velocity thru reactor, fpm	486		292		
Max allowable temp, °F	1300		1100		
Min. allowable temp, °F	700		550		
Module Dimensions, (L x W x D)	12.5" x 12.5" x 8.5"		18" x 18" x 10"		
Module weight, lb	40		45		
Total weight per reactor, lb	360		2425		
Housing:					
Material/Thickness, in	3/8" plate 316L SS		3/8" plate 316L SS		
Number of Section	2		1		
Weight of Heaviest Section, lb	30,000		20,000		
Insulation Lining	Ceramic fiber block		Ceramic fiber block		
Material/Thickness, in	7" thick 8 lbs density		7" thick 8 lbs density		
Thermal Cond, Btu-in/hr ft ² °F	40 btu-in/hr ft ² °F		40 btu-in/hr ft ² °F		
Method of Attachment	Weld stud w/ your attachmt		Weld stud w/ your attachmt		
Design pressure, psig	3.5		3.5		
Operating pressure, psig	15		15		
Design temperature, °F	1300		1300		
Ducting					
Material/Thickness, in	3/8" plate 316L SS		3/8" plate 316L SS		
Cross Section, ft x ft	3' tall x 2' wide		3' tall x 2' wide		
Duct Velocity, fpm	700		700		
Electric Heater					
Manufacturer	Watlow				
Type	Round Tubular Elements - Watrod				
Number of Heat Zone	57 heating elements				
Watt Density, W/in ²	12				
Power, kW	155				
Voltage/Current rating	480V / 186.5 amps				

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Recuperative Heat Exchanger			
Manufacturer	Exothermic Eclipse		
Type	Plate type		
Material	316L SS		
Ht transfer coefficient, Btu/hr ft ² °F	5.76		
Heat exchange area, ft ²	2,179		
ΔT (LMTD)	194		
Heat Eexchanger duty, Btu/hr	2,439,000		
Ammonia Injection Manifold			
Type/Arrangement	Spider		
Feed Inlet Dia in	1/2" dia.		
Supply Pressure/Temp (psi/°F)	1 psig @ 100%		
Material/Quantity	316L SS		
No. of nozzle bar per manifold	6 nozzles		
No. of nozzles per bar	6		
Spacing between nozzles, in	3.5"		
Nozzle opening diameter, in	0.5"		
Weight			
Shipping (Heaviest), lb	30,000 lbs	15,000 lbs	
Installed, lb	30,000 lbs	15,000 lbs	
Shipping dimension (L x W x H), in	12 5' x 5' x 6'	12 5' x 5' x 6'	
Notes			
NOTES: 1. Deleted 2. Deleted 3. Seller's data is rounded and based on preliminary engineering design. 4. Sub component tag numbers: 24590-HLW-HOP-HX-00001 24590-HLW-HOP-HTR-00001 24590-HLW-HOP-SCO-00001 24590-HLW-HOP-SCR-00001			